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# Can supplier innovations substitute for internal R & D? A multiple case study from an absorptive capacity perspective

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ABSTRACT

Prior literature suggests that significant internal R & D resources are needed to leverage suppliers for innovation and that external knowledge sources can be used to complement the internal knowledge base. Based on the analysis of four inbound open innovation projects at Fortum, a multinational energy utility company, we argue that companies with low R & D intensity may adopt an alternative approach which aims at substituting – not merely complementing – internal R & D with external innovations. We adopt the absorptive capacity perspective while investigating the cases and focus on four distinct capabilities: acquisition, assimilation, transformation, and exploitation. We find that the substitution approach consists of short-term research on new technological areas in order to gain the ability to identify and evaluate alternative technologies, as well as joint business models and operations based on complementary capabilities between the parties. The cases also suggest that the innovation process requires significant collaboration and the buying company's supplier management capabilities may improve the success of inbound open innovation projects of this type.

## 1. Introduction

Innovation is increasingly the outcome of a collective effort rather than a product of a single firm. The open innovation (Chesbrough and Crowther, 2006) approach suggests that it is often beneficial for firms to collaborate with others in developing and commercialising innovations. Increased linkages to external partners, such as suppliers, customers, universities, and competitors, are considered to lead to better innovation outcomes (Felin and Zenger, 2014). The benefits of *inbound* open innovation, where companies scan the external environment in search of interesting ideas or scout new technologies, are especially thoroughly researched (Bianchi et al., 2016; Sisodiya et al., 2013; West and Bogers, 2014).

Recently, the innovation potential of suppliers has gained a lot of attention (Brem, 2010; Sjoerdsma and van Weele, 2015; Yan et al., 2017), and in fact they have been found the most important open innovation partners (Un et al., 2010). Tapping *supplier innovation*, i.e. accessing suppliers' innovation and product development capabilities (Wagner, 2012), may provide their customers access to new technologies (Ellis et al., 2012) and innovative ideas about products and processes (Wagner and Bode, 2014). Collaboration with suppliers has been found to lead to a shorter time to market, improved product quality, and reduced development costs (Johnsen, 2009), which is why companies are increasingly looking for ways to leverage their suppliers' innovation potential (Smals and Smits, 2012).

From an organisational perspective, absorptive capacity is considered an important requirement for inbound open innovation (Azadegan, 2011; Cheng and Huizingh, 2014; Christensen et al., 2005; Geum et al., 2013; Sáenz et al., 2014). Absorptive capacity, defined as the ability to recognise new knowledge, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1989, 1990) can be understood as a high-level organisational capability which considers a firm's ability to gain innovation benefits from interactions with external parties. Without absorptive capacity, suppliers' innovativeness does not transmit to the buyer (Ettlie and Pavlou, 2006; Knoppen et al., 2015; Lawson and Potter, 2012; Sáenz et al., 2014). Absorptive capacity can make buyers more agile and flexible, since they may respond to environmental changes by combining both internal and external competences (Tavani et al., 2013).

The majority of the open innovation studies have focused on a context where the focal firm has significant internal R & D resources (Dahlander and Gann, 2010; Schoenherr et al., 2012; Spithoven et al., 2011; West and Bogers, 2014). The potential of external sources is seen in their ability to complement internal knowledge resources (Hung and Chou, 2013). Similarly, studies on absorptive capacity have emphasised how the ability to assimilate and exploit new knowledge is a result of internal R & D investments (Cohen and Levinthal, 1990). A strong focus on external technology acquisition in place of internal R & D has been

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considered a weakness (Kim et al., 2016). So far, the question of whether (and how) companies with low internal R & D resources can successfully substitute internal R & D with open innovation has remained poorly understood (Dahlander and Gann, 2010; Tanskanen et al., 2017). The study adopts absorptive capacity as a theoretical framework and focuses on its four distinct capabilities: acquisition, assimilation, transformation, and exploitation (Todorova and Durisin, 2007; Zahra and George, 2002). To explore how internal R & D may be substituted with open innovation, we define a research question to guide our study:

> How do the capabilities of acquisition, assimilation, transformation, and exploitation manifest themselves in substituting internal R & D with supplier innovations?

First, we present a review of previous studies on open innovation and absorptive capacity. Then, in the methodology section, we describe the case selection principles and methods for the data collection and analyses. Next, findings from the cases are presented. Finally, we answer to our research question by formulating propositions and discuss the significance of the results from theoretical and practical viewpoints.

## 2. Theoretical background

Open innovation is defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation respectively” (Chesbrough et al., 2006, p. 1). The first part of this definition is referred to as inbound open innovation, which is defined as the acquisition of external knowledge to improve internal innovation (Ritala and Huizingh, 2014). Firms may generate ideas from their internal technology and knowledge base, but they can also systematically scan the external environment in search of interesting ideas. Technology-based innovation includes a high level of technological and market uncertainty, which is why flexibility in terms of openness is valuable for companies (van de Vrande et al., 2006). Various recent empirical studies have evidenced the positive overall effects of openness on innovation performance (Alexy et al., 2016; Cassiman and Valentini, 2016; Cheng and Huizingh, 2014; Laursen and Salter, 2006) and financial performance (Du et al., 2014; Noh, 2015).

Open innovation theories address various external stakeholders, such as end users, suppliers, governments, environmental agencies, research institutes, and competitors, while the most extensively researched collaborators are suppliers and customers (Gassmann et al., 2010). Research related to collaborative innovation between a buyer and a supplier has grown during the last 30 years (Johnsen, 2009) and the potential of involving suppliers in the innovation process has been widely recognised (Azadegan and Dooley, 2010; Mazzola et al., 2015; Schiele, 2010). The innovation potential of suppliers is strengthened by their familiarity of their customers’ needs and a position where mechanisms for knowledge transfer may already be in place (Un et al., 2010). Increasing competition in many industries has led companies to rely on their suppliers not only as sources of products and services, but also of ideas and innovations (Luzzini et al., 2015; Phillips et al., 2006).

In their review of the open innovation literature, Dahlander and Gann (2010) conclude that most of the studies consider open innovation as a complement to internal R & D and that intensive internal R & D is often considered necessary to engage in open innovation. If companies invest a large portion of their income in R & D resources (high R & D intensity), for example by allocating personnel into R & D activities, they may be able to understand and use external technological knowledge for introducing new products (Cohen and Levinthal, 1990; Hung and Chou, 2013). There are several proposed explanations for this. First of all, integrating new knowledge and co-creating innovations with external partners is considered to require some overlap in competences and knowledge bases (Hung and Chou, 2013; Mowery et al., 1996). To understand each other, organisations must have moderate cognitive distance to each other (Nooteboom et al., 2007). On the one hand, if the knowledge bases are too similar, learning opportunities are limited. On the other hand, if they are too distinct, knowledge transfer becomes difficult. High internal R & D may also increase the buyers’ attractiveness as partners, leading to more fruitful collaborations (Dahlander and Gann, 2010). However, due to their limited internal resources, collaboration may be more critical for companies with low R & D intensity (Barge-Gil, 2010). It is argued that all organisations should seek a balance between closed and open innovation (Kim et al., 2016; Rothaermel and Alexandre, 2008). Kim et al. (2016) propose that relying too strongly on others should be considered a significant weakness because the lack of internal R & D resources may limit an organisation's ability to explore new knowledge domains. Furthermore, external knowledge is often also accessible to others, which makes it difficult for companies relying on it to maintain a sustainable competitive advantage.

The level of absorptive capacity has been linked to successful open innovation performance in multiple investigations (Bianchi et al., 2016; Enkel and Gassmann, 2008; Randhawa et al., 2016; Saebi and Foss, 2015; West and Bogers, 2014). Similar ideas about the role of internal R & D can also be found from studies on absorptive capacity. In the seminal studies in this research stream, Cohen and Levinthal (1990, 1989) define two justifications for investing in internal R & D: 1) generating new innovations internally and 2) gaining the ability to explore and exploit knowledge from outside the firm's borders, that is, the absorptive capacity. The linkage between absorptive capacity and internal R & D has been so strong that in many quantitative studies the level of absorptive capacity has been measured by looking at variables such as R & D expenditures or R & D intensity (Bianchi et al., 2016; Lane and Lubatkin, 1998; Rothaermel and Alexandre, 2008; Stock et al., 2001; Tsai, 2001). This connection has been justified by theories of individual learning, which suggest that prior related knowledge is needed for memorising, accessing, and organising new knowledge, and establishing linkages with pre-existing concepts (Cohen and Levinthal, 1990). Therefore, to commercially benefit from external knowledge, companies have to integrate it and combine it with existing knowledge and investing in R & D resources is a good way to make sure that the employees are able to do that.

Most open innovation studies focus on high-tech industries where high investments in internal R & D are common. However, a couple of exceptions can be found. Chesbrough and Crowther (2006) examine the use of open innovation practices in traditional industries, such as chemicals, home improvement hardware, and consumer packaged goods. They found out that – similar to high-tech industries – those companies which engaged in open innovation did not use it to substitute for internal R & D; instead they maintained or even increased their R & D investments. Spithoven et al. (2011) investigate similar traditional industries in Belgium. They conclude that while the absorptive capacities of the investigated companies remained low due to the lack of R & D investments, collaboration with collective research centres allowed them to build collective absorptive capacity.

While there is a lot of evidence which suggests that significant internal R & D investments are important for absorptive capacity and inbound open innovation, due to the limited number of studies which investigate low R & D contexts, it can be argued that the question of whether open innovation can replace internal R & D is still unresolved (Dahlander and Gann, 2010). Investigation into the collective research centres, for example, shows that there may be alternative ways of building absorptive capacity (Spithoven et al., 2011). In this study, we look at inter-organisational processes between a buyer and its suppliers to find out how internal R & D may be substituted with inbound open innovation.

## 3. Conceptual model

The absorptive capacity process has been conceptualised by distinguishing between four capabilities that comprise it: acquisition,